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Chinese consumer attitudes towards energy saving: The case of household electrical appliances in Chongqing

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HIGHLIGHTS

- We report on a survey of 246 citizens in Chongqing, China.
- We examined attitudes towards energy saving in the context of household electrical appliances.
- Citizens are not well informed on how to save energy in the home.
- The sources of information and trust in these sources vary greatly across the population.
- Willingness to change behaviour is also highly variable.

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ABSTRACT

Energy saving is now an important component of China's energy policy. This paper reports the findings of a survey carried out in 2009 and 2010 of 246 citizens at different locations in the municipality of Chongqing in order to reveal information about attitudes towards energy and energy saving in the context of household electrical appliances. This study shows that citizens in Chongqing receive relatively little information and guidance on how to save energy in the home and that their stated level of knowledge on this subject is also rather limited. Respondents showed some willingness to save energy as long as this did not reduce their comfort and convenience, and they appeared likely to respond to economic incentives, such as high electricity prices or discounts on appliances. But they seemed to be unaware of the potential for information to help them save energy. The survey also demonstrated a high degree of heterogeneity across society with respect to sources of information and trust in those sources and with respect to attitudes to energy saving at home. These results show that the government needs to substantially adjust its strategies for promoting household energy saving.

1. Introduction

Since 2005 energy efficiency has been the top priority in China's national energy policy, with the twin aims of addressing both energy security and climate change. Nationwide energy shortages arising from rapid and energy-intensive economic growth persuaded the government to put in place a range of measures with the objective of reducing intensity by 20% between 2005 and 2010. The primary focus of these measures was on industry, as this sector held the promise for easily achievable gains in energy savings, but buildings, transportation and government procurement were also targeted. In the residential sector, steps were taken to raise minimum energy efficiency standards for electrical appliances, and to enforce energy efficiency labelling of appliances. Programmes were also run to raise awareness among citizens of the importance of saving energy at home.

These policies and measures were first promulgated by the central government and then implemented by the Provincial Municipalities and Autonomous Regions, with each of these jurisdictions receiving individual targets for each year up to 2010 (Andrews-Speed, 2009; Zhou et al., 2010). Official statistics published by the government early in the year 2011 indicate that the reduction in energy intensity between 2005 and 2010 amounted to 19.1% (Li, 2011), just short of the 20% target, but a substantial achievement nonetheless. This success can be attributed mainly to improvements in industrial energy efficiency, and only to a lesser extent to adjustments in the structure of the economy or to improved energy efficiency and energy savings in other sectors (Levine et al., 2010).

The success of the policies directed at the industrial sector was due, in part, to the relatively small number of highly energy intensive enterprises which needed to be targeted in order to achieve a large saving of energy. A more profound challenge lies

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in the need to promote energy saving in the residential sector, especially in urban areas. By energy saving, we mean a reduction in the total use of energy through using more energy-efficient appliances and using these appliances less frequently.

In China, as in many industrialising countries, this challenge is formidable for two main reasons. First, energy consumption in the residential sector is rising faster than in any other sector. Household energy demand in China doubled between 2000 and 2008, rising from 7% to 11% of national energy consumption. Over the same period, residential consumption of electricity tripled. To a great extent this would have been driven by a rise in the number of household appliances. For example the number of air conditioners rose from thirty per one hundred urban households in 2000 to one hundred appliances per one hundred urban households in 2008 (National Bureau of Statistics, 2010). Second, instead of a few thousand energy-intensive enterprises whose behaviour can be directed through traditional administrative instruments, China has about 620 million urban residents in about 200 million households (National Bureau of Statistics, 2010). Changing behaviours across this population will prove to be greatly more challenging than in heavy industry. As will be described below, China's central government has introduced a number of policy instruments to be implemented nationally, or by provincial and city governments. These include raising the energy efficiency standards of appliances, energy efficiency labelling of appliances, offering discounts on the purchase price of the most energy efficient household appliances, and starting schemes to buy-back old appliances.

Published studies in the English language on energy saving in China's residential sector are relatively few. The majority fall into one of two groups. The first group examined total residential energy consumption, with an urban or rural focus (e.g., Zhang, 2004; Tonooka et al., 2006). The second, and larger, group analysed the ownership of household energy-using appliances and the efforts taken by the government to raise efficiency standards and to enforce energy labelling (e.g., Fridley et al., 2001; Brockett et al., 2002; Lin and Rosenquist, 2008; Levine et al., 2010; Zhou et al., 2010, 2011; Tao and Yu, 2011). The link between lifestyle and energy use has been identified, as have risks of a rebound effect arising from improved energy efficiency (Wei et al., 2007; Murata et al., 2008; Ouyang et al., 2010; Yu et al., 2011).

Reports from systematic studies into awareness of, attitudes towards and behaviour with respect to energy saving in Chinese households have only started to appear in any number since 2009. Surveys in Beijing Municipality and in Liaoning Provinces investigated environmental awareness and willingness to save energy (Feng et al., 2010; Wang et al., 2011; Yu et al., 2011). These and other projects which examined how the characteristics of buildings determine behaviour and energy consumption (Chen et al., 2009, 2010, 2011; Ouyang and Hokao, 2009) have identified a range of factors which appear to determine energy use behaviours in the home. These included the age and size of the dwelling, the ownership of the home, and the age and number of household members.

The aim of this study is to examine the knowledge, awareness and stated preferences of citizens in Chongqing Municipality, south-west China, with respect to energy saving in general and specifically with respect to household electrical appliances. The main focus was on information sources and stated intentions of changing behaviour. The study draws on a questionnaire survey with 246 respondents carried out in Chongqing during the period 2009–2010. An earlier paper (Ma et al., 2011) reported some preliminary and partial results from an initial sample of 182 individuals. The current paper presents a more detailed analysis from the completed survey. It starts by explaining the rationale for the study and providing background information on the Chongqing region. A brief summary of the survey itself is followed by a presentation of the results, a discussion and the conclusions.

2. Survey rationale

As in most industrialized and industrializing nations, China's government is seeking to set the country on a path to more sustainable use of energy and natural resources (Andrews-Speed, 2012); that is to say, it seeks to take the nation through a socio-economic transition (Smith et al., 2005; Geels and Schot, 2007).

The policy instruments available to governments are of three main types (Schipper and Hawk, 1991; Woods, 2008; Oikonomou et al., 2009; Ek and Soderholm, 2010). Economic instruments, such as raising energy prices or taxing energy consumption, can be used to discourage wasteful energy use. Conversely, grants and subsidies can promote investment in appliances or materials which can enhance energy efficiency or save energy in other ways. Administrative and regulatory instruments influence behaviour directly by forbidding or banning certain behaviours or products, by placing obligations on actors, or by setting standards for appliances.

During the period our field research, China's government was applying both types of instrument to the household sector. In 2009, a subsidy on the purchase of the most efficient air conditioners was introduced (National Development and Reform Commission, 2009). This amounted to a discount of Yuan RMB 500–850 off original prices in the range Yuan RMB 3000–4000.[1] This programme was so successful that the market share of energy efficient air conditioners rose from 5% to 80% in just two years. As a result the government terminated what was to be a three-year the programme a year early (Xin, 2011). A new subsidy programme covering air conditioners, washing machines, refrigerators and water heaters was introduced in May 2012.

In June 2010 the government launched a programme to buy-back old household appliances, by giving a discount of 10% on the price of the new appliance. This programme covered televisions, computers, washing machines, air conditioners and refrigerators, and ran until the end of 2011 (Ministry of Commerce, 2010). In addition, mandatory energy efficiency labelling of household appliances was widespread at the time of our survey, after its introduction in 2005, as were minimum energy performance standards (Zhou, 2008; Zhou et al., 2011).

Whilst economic and administrative policy instruments provide a vital foundation, they may be insufficient by themselves to encourage greater energy saving on the part of the citizens. Information and education are usually needed in order not just to promote a general awareness of the need to save energy but also to provide detailed information on how to save energy. This need arises from two sources. First, modern energy systems are complex and difficult to understand. The technical, economic and regulatory systems which link the primary energy resource to the final supply are all but invisible to the energy user, except for the price. If you add to this ignorance the emotional, and often confusing, rhetoric arising from the highly sophisticated scientific debates concerning the physics of climate change (Ricci et al., 2010), then it is hardly surprising that most individuals and households are unable to grasp the nature of the energy challenges facing their country or the world, let alone how their own behaviours effect energy use and climate change. All governments have the responsibility of raising the level of understanding of their citizens of both the wider challenges and of the link between behaviours and energy use.

[1] During the period of the survey, the exchange rate was around US$ 1 = Yuan RMB 6.7.